

July 19, 2002

Hi Ed,

Thank you again for providing such a supportive letter towards the "Updates to Title 24 Treatment of Skylights".

This morning Dave Peterson and I had a very productive discussion on the content of the lighting controls council proposal as contained in your letter. We discussed the letter point by point and I thought I would report on this discussion as I think that Dave and I have converged on an improved proposal. I have copied the text of the letter into this e-mail below and interspersed my responses to the letter. My responses are preceded by a >>.

Please circulate the contents of this e-mail to the lighting controls council so they are apprised of the daylighting controls proposals and their rationale.

If you have comments on this proposal please contact me.

Sincerely,

Jon McHugh, PE, LC
Heschong Mahone Group
11626 Fair Oaks Blvd #302
Fair Oaks, CA 95628 (Sacramento)
(916)962-7001
(916)962-0101 FAX
e-mail: mchugh@h-m-g.com
URL: www.h-m-g.com

Requirements for Automatic Multi-Level Daylighting Controls

119 (e) Automatic Multi-level Daylighting Control Devices. Automatic multi-level daylighting control devices shall:

California Proposed Language

1. Be capable of automatically reducing the general lighting in the controlled area in multiple steps in response to available daylight while maintaining a reasonably uniform level of illuminance. These controls shall have at least one control step that is between 50% and 70% of design illuminance and the controlled electric lighting shall consume less than 35% of rated power at minimum light output. A reasonably uniform level of illuminance in an area shall be achieved in a manner described in Section 131 (b)

Concern:

The use of "50% to 70%" and "consume less than 35% at the minimum setting" is confusing.

NEMA Recommended Language:

1. Be capable of automatically reducing the general lighting in the controlled area in multiple or continuous steps in response to available daylight while maintaining a reasonably uniform level of illuminance as described in Section 131 (b) 1 through 3
A. If stepped switching is used, the controls shall provide at least two control channels (relays) per zone and be installed in a manner such that at least one control step shall act to reduce the rated power of the general lighting from between 30% to 50% and one other control step shall act to reduce the rated power of the general lighting from between 65% to 100%.

B. If continuous dimming is used, the controlled electric lighting shall consume less than 35% of rated power at minimum light output.

>> I agree with the use of power levels throughout the definition instead of mixing illuminance and power requirements in the same requirement. I suggest the following wording of the same concept:

>> A. If stepped switching is used, the controls shall provide at least two control channels (relays) per zone and be installed in a manner such that at least one control step shall act to reduce power draw of general lighting in the daylit zone by 30% to 50% of rated power and another control step shall reduce lighting power by 65% to 100%.

>>B. If continuous dimming is used, the controlled electric lighting shall consume less than 35% of rated power at the minimum automatically controlled light output.

2. OK

3. OK

4. OK

5. OK

California Proposed Language

6. If the device uses step switching, status of each control step will be annunciated by an indicator light on the control device

Concern:

The commissioning and operational need applies to both dimming and switching systems. In addition, the code should allow both standalone control devices and control systems.

NEMA Recommended Language:

6. The control device, or system, shall annunciate the level of the controlled zone

A. If the device uses step switching, the status of each control step will be annunciated by an indicator light on the control device

B. If the device uses continuous dimming, the dimming level will be displayed on the control device.

Exemption

If the control device is part of a networked system with a central display of each control zone level, the status readout on each individual control device is not required.

>> I think this is good as written. I would like to receive comments from other control manufacturers that they do not perceive this as an undue burden.

California Proposed Language

7. If the device has a time delay, the time delay shall be capable of being overridden or set to less than 5 seconds time delay for the purpose of commissioning

Concern:

Device may be left in test mode

NEMA Recommended Language:

7. If the device has a time delay, the time delay shall be capable of being overridden temporarily to less than 5 seconds for testing or commissioning. The device shall automatically return to the Operate mode, restoring the programmed time delays, after 15 minutes.

>>I think this is good as written. I would like this to be compatible with any existing control that restores the test mode after some given time period. If this time period is 15 minutes or 1 hour, it does not matter from the concept being promoted here.

California Proposed Language

8. The light sensor shall have a linear response with 5% accuracy over the range of luminances measured by the sensor; and,

Concern:

No requirements to ensure long-term accuracy or life of the sensor.

NEMA Recommended Language:

8. The light sensor shall have a predictable response over its operating range, temperatures and time. Accordingly it shall:

A. have a linear response with 5% accuracy over the range of luminances measured by the sensor at 70 F

B. maintain a 10% accuracy with temperature variation from 32 -100 F

>>I like the language as written, but to be meaningful, I would like a reference to a test standard. I am researching this but I would appreciate any leads your members might find on an appropriate standard.

California Proposed Language

9. The light sensor shall be separate from the control device where calibrations adjustments are made; and,

Concern:

Need to specify the preferred location for the sensor.

NEMA Recommended Language:

9. The sensor shall be mounted in one of the light wells within the zone to be controlled and shall be separate from the control device where calibration adjustments are made

>> Though I agree with this statement philosophically, I do not think we have enough performance data to mandate a specific sensor location. We are in the process of starting to collect this performance data but we will not be completed until the end of 2002.

10.OK

11. NEW

Concern:

Overrides to the daylighting control are not addressed

NEMA Recommended Language:

11. The lighting control device shall provide a temporary manual override for each control step allowing the user to select a desired light level. The override duration will not exceed 2 hours. At the end of that period, the control device will reinstate the light level dictated by the automatic control operation.

>> I support this proposal as written, however I would like to hear from other manufacturers to assure there are not concerns about this proposal that I may have missed.

12. NEW

Concern:

Failure annunciation is not addressed. Title 24 2001 has an exception to this requirement: "Photocell sensors or other devices where a status signal is infeasible because of inadequate power." Since this standard requires the control unit to be separately mounted from the sensor itself, this exemption would not apply.

NEMA Recommended Language:

12. The lighting control device or system shall provide a visible warning that the system has failed or malfunctioned.

>>After discussion with Dave Peterson and receiving e-mail on this issue from Mike Fisher at Easylite, I think it makes sense that the code be specific about the failure mode that triggers a warning. Thus I think the language should be appended as follows:

>>"The lighting control device or system shall provide a visible warning that the all of the control system outputs for each control zone have failed to change state or dimming level in one week."

>> This warning light tells us that there is something wrong with the system whether it be a failed sensor or a commissioning problem (setpoint set far too high). The "all of the outputs for each control zone" helps to identify that there may be times of year where the second stage of control is not used for extended periods of time.

>> The question I have is should there be a requirement for computer based EMS systems that the visual indicator be a light back at the relay panel indicating which controls circuits have not been activated over the course of a week? A computer based system may have a screen of flags that are rarely watched.

131(b) Controls to Reduce Lighting.

Concern:

The proposed California changes reflect those made in 119 (e) 1 above. The original 131 (b) wording included all lighting within enclosed spaces greater than 100 square feet, not simply those with daylighting.

Recommended Language:

Keep the original.

>> I disagree with this - the original language was ambiguous. I do agree the language should be improved based upon the suggestions proposed in the NEMA letter for 119(e) item 1.

>> This language would be as follows: " 131(b) Controls to Reduce Lighting. The general lighting of any enclosed space 100 square feet or larger in which the connected lighting load exceeds 0.8 watts per square foot for the space as a whole, and that has more than one light source (luminaire), shall have multi-level lighting controls that reduce lighting power in multiple steps while maintaining a reasonably uniform level of illuminance throughout the area controlled.

A. If stepped switching is used, the controls shall provide at least two switches per zone and be installed in a manner such that lighting power can be reduced by 30% to 50%.

>>B. If continuous dimming is used, the controlled electric lighting shall consume less than 35% of rated power at the minimum dimming level.

Mandatory Automatic Lighting Controls in the Daylit Zone under Skylights

California Proposed Language

131 (c) Daylit Areas. Lamps providing general lighting that are in or are partially in the daylit area shall be controlled according to the applicable requirements in items 1 and 2 below.

1). Daylit areas greater than 250 sq ft in any enclosed space shall have at least one additional multi-level control device that:

A. Controls 50% or more of the lamps in the daylit areas separately from other lighting in the enclosed space and

B. Controls luminaires in vertically daylit areas separately from horizontally daylit areas and

C. Has at least one control step that is between 70% and 50% of design illuminance and

D. Shall maintain a reasonably uniform level of illuminance in the daylit area as described in Section 131(b) 1 through 3

1). When the daylit area in any enclosed space is under skylights and has a total area greater than 2500 square feet, the general lighting in the daylit area under the skylights shall be controlled separately by either

A. An automatic multi-level daylighting control; or

B. A multilevel astronomical time-switch control with an override switching device that complies with section 131

(d) 2

Concern:

Original wording of Section 131 (c) 1 is clearer than new version. Description of astronomical time switch lacks detail

NEMA Recommended Language:

(c) Daylit areas in any enclosed space greater than 250 square feet shall meet the requirements of 1 and 2 below

1. Such areas shall have at least one control that:

A. Controls only luminaires in the daylit area

B. Controls at least 50% of the lamps or luminaries in the daylit area in a manner described in Section 131(b) 1 through 4, independently or all other lamps or luminaries in the enclosed space. The other luminaries in the enclosed space may be controlled in any manner allowed by Section 131 (b) 1 through 4.

2. Such areas shall have controls that control the luminaries in each vertically daylit area separately from the luminaries in each horizontally daylit area.

(d) When the daylit area in any enclosed space is under skylights and has a total area greater than 2500 square feet, the general lighting in the daylit area under the skylights shall be controlled separately by either

1. An automatic multi-level daylighting control or

2. A multilevel astronomical time switch control that meets the following criteria:

- * Has 2 channels (relays) per zone
- * Has a separate offset control for each channel of 1-120 minutes
- * Is accurate with +/- 15 minutes (sunrise/sunset prediction)

- * Battery backup for 10 days
- * Stores longitude and latitude in non-volatile memory
- * Displays date/time; sunrise and sunset; switching times for each channel.
- * Provides a temporary manual over ride for each channel allowing the user to select a desired light level. The over ride duration will not exceed 2 hours.

>> I think this is a welcome addition to the code change proposal. The only thing I would revise is that the offset control be 1-240 minutes. A four hour offset is not unreasonable for the minimum step level of control.

>> I appreciate your thoughtful comments. If you have any thoughts on my replies please contact me.

Sincerely,

Jon McHugh, PE, LC
Heschong Mahone Group
11626 Fair Oaks Blvd #302
Fair Oaks, CA 95628 (Sacramento)
(916)962-7001
(916)962-0101 FAX
e-mail: mchugh@h-m-g.com
URL: www.h-m-g.com

<<july16005NEMA Ed Gray comments.doc>>